

Appendix D

Project Information/Drawdown and Refill Model

Description of the DFG Lake Davis Reservoir Drawdown and Refill Model

DFG's Reservoir Drawdown and Refill Model was developed to evaluate the amount of time it may take to change the volume of the reservoir to the treatment levels in the alternatives and to refill the reservoir from those treatment levels. These times may vary greatly depending on climatic conditions within the basin. Because these conditions cannot be predicted, drawdown and refill rates are calculated based on a 38-year period of historical record (1967 to 2004).

The Lake Davis drawdown and refill model (Appendix D) takes into account inflow into the reservoir, discharge from the reservoir, and evaporation losses. Changes in reservoir volume are calculated on a daily basis as follows: starting volume plus inflow (based on DWR records) minus the assumed outflow and the amount of water that evaporates from the surface of the reservoir (DWR estimates). The model assumes a starting reservoir volume of 45,000 AF on January 1 of the year of treatment. Each year within the period of record is evaluated independently using the actual inflows to the reservoir during that year. The estimates discussed for all of the project alternatives are based on releasing water from the reservoir using only the two lowest valves (at the 5,700 and 5,750-foot levels) with the new DWR fish strainers in place to draw the reservoir down to the target level. This assumption results in a maximum discharge rate of 145 cfs from the reservoir during drawdown. This maximum discharge decreases as the reservoir gets lower, as shown in the Reservoir Rating Table. A second model run was made assuming that 75 cfs could be pumped over the dam in the months of April, May and September. A parallel set of runs was also made using a starting elevation of 60,000 AF.

Each year within the period of record is evaluated independently using the actual inflows to the reservoir during that year. The number of years in which the target volume is reached by a specified date is then counted.

Two additional assumptions are made in modeling refill. The first is that refill will begin in October. The second is that discharge during refill is assumed to be 10 cfs. The model does not incorporate reduced outflows due to the reservoir potentially not having sufficient water stored to maintain a 10 cfs release throughout the refill period. This assumption would only come into effect under Alternative E, which calls for draining the reservoir. Under some alternatives, the reservoir did not refill by the end of the period of record in the last few years. Where this occurred, these years are excluded from the refill evaluation.

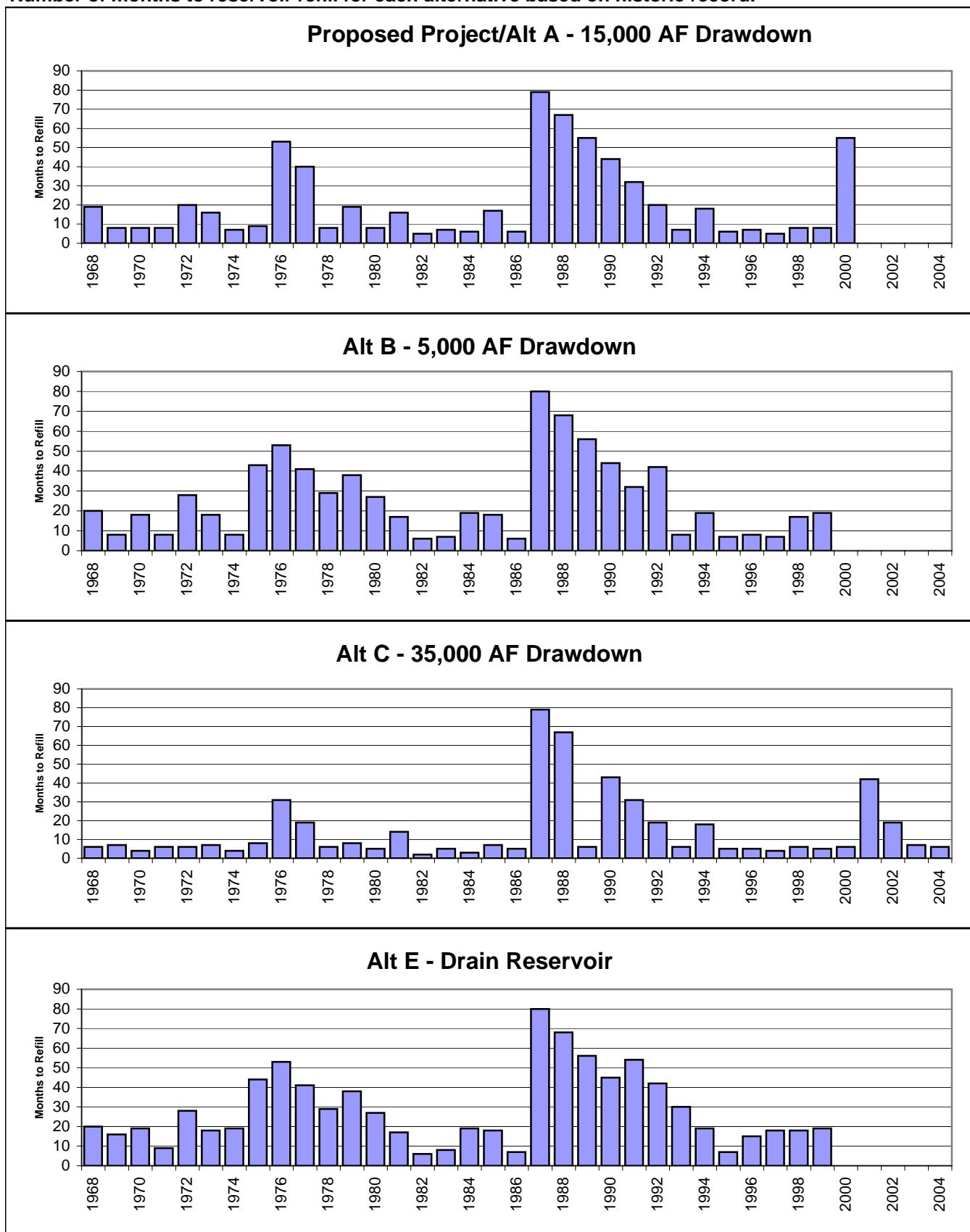
Use of the Model

The model is used to evaluate how long the reservoir might take to reach or refill from the target treatment volumes described by the various alternatives. The specific future inflows Lake Davis will receive in the year of treatment and in the years following treatment cannot be predicted. Because of this, the model is used to describe the bounds and likelihood that the treatment volume will be reached by the appropriate mid August through mid-October timeframe for treatment. The likelihood of drawdown or refill within a particular timeframe is expressed as the fraction of years within the period of record that the reservoir would have achieved the target level. It is also expressed as the amount of time needed to have a 75 percent probability of attaining the target level. This information is used to assess impacts for various resources.

Drawdown Model Summary Tables

Refill Model Summary

Number of months to reservoir refill for each alternative based on historic record.



Reservoir would not refill to 45,000 AF within period of available record subsequent to treatment in years without bars.

Lake Davis Rating Table

Lake Davis

Reservoir Elevation-Area-Capacity-Max Discharge Ratings Used for Reservoir Drawdown and Refill Models

| Reservoir Elevation (ft) (Elevation) | Reservoir Area (acres) (Area) | Reservoir Storage (a-f) (Storage) | Maximum Outlet Capacity (cfs) (Outlet) |
|--------------------------------------|-------------------------------|-----------------------------------|--|
| 5,700.0 | 11.0 | 107 | 0.0 |
| 5,701.0 | 11.5 | 118 | 13.6 |
| 5,702.0 | 12.0 | 130 | 27.2 |
| 5,703.0 | 13.0 | 142 | 40.8 |
| 5,704.0 | 13.5 | 155 | 54.4 |
| 5,705.0 | 14.0 | 169 | 68.0 |
| 5,706.0 | 14.5 | 183 | 91.0 |
| 5,707.0 | 15.0 | 197 | 114.0 |
| 5,708.0 | 16.0 | 213 | 114.9 |
| 5,709.0 | 16.5 | 228 | 115.9 |
| 5,710.0 | 17.0 | 245 | 116.8 |
| 5,711.0 | 17.5 | 262 | 117.8 |
| 5,712.0 | 18.0 | 280 | 118.7 |
| 5,713.0 | 18.5 | 298 | 119.6 |
| 5,714.0 | 19.0 | 316 | 120.6 |
| 5,715.0 | 20.0 | 338 | 121.5 |
| 5,716.0 | 33.0 | 364 | 122.5 |
| 5,717.0 | 46.0 | 404 | 123.4 |
| 5,718.0 | 58.0 | 456 | 124.3 |
| 5,719.0 | 70.0 | 520 | 125.3 |
| 5,720.0 | 81.0 | 595 | 126.2 |
| 5,721.0 | 92.0 | 682 | 127.2 |
| 5,722.0 | 102.0 | 778 | 128.1 |
| 5,723.0 | 112.0 | 885 | 129.0 |
| 5,724.0 | 121.0 | 1,002 | 130.0 |
| 5,725.0 | 129.0 | 1,132 | 130.9 |
| 5,726.0 | 145.0 | 1,268 | 131.8 |
| 5,727.0 | 164.0 | 1,422 | 132.8 |
| 5,728.0 | 185.0 | 1,596 | 133.7 |
| 5,729.0 | 209.0 | 1,793 | 134.7 |
| 5,730.0 | 236.0 | 2,015 | 135.6 |
| 5,731.0 | 265.0 | 2,265 | 136.5 |
| 5,732.0 | 297.0 | 2,546 | 137.5 |
| 5,733.0 | 332.0 | 2,860 | 138.4 |
| 5,734.0 | 369.0 | 3,211 | 139.4 |
| 5,735.0 | 409.0 | 3,600 | 140.3 |
| 5,736.0 | 452.0 | 4,030 | 141.2 |
| 5,737.0 | 497.0 | 4,504 | 142.2 |
| 5,738.0 | 545.0 | 5,025 | 143.1 |
| 5,739.0 | 596.0 | 5,595 | 144.1 |
| 5,740.0 | 645.0 | 6,028 | 145.0 |

| Reservoir Elevation (ft) (Elevation) | Reservoir Area (acres) (Area) | Reservoir Storage (a-f) (Storage) | Maximum Outlet Capacity (cfs) (Outlet) |
|--------------------------------------|-------------------------------|-----------------------------------|--|
| 5,741.0 | 706.0 | 6,883 | 145.7 |
| 5,742.0 | 772.0 | 7,622 | 146.4 |
| 5,743.0 | 842.0 | 8,429 | 147.1 |
| 5,744.0 | 915.0 | 9,306 | 147.9 |
| 5,745.0 | 992.0 | 10,259 | 148.6 |
| 5,746.0 | 1,073.0 | 11,292 | 149.3 |
| 5,747.0 | 1,158.0 | 12,406 | 150.0 |
| 5,748.0 | 1,246.0 | 13,608 | 150.7 |
| 5,749.0 | 1,321.0 | 14,903 | 151.4 |
| 5,750.0 | 1,423.0 | 16,276 | 152.1 |
| 5,751.0 | 1,526.0 | 17,750 | 152.9 |
| 5,752.0 | 1,629.0 | 19,328 | 153.6 |
| 5,753.0 | 1,732.0 | 21,009 | 154.3 |
| 5,754.0 | 1,836.0 | 22,793 | 155.0 |
| 5,755.0 | 1,939.0 | 24,680 | 155.7 |
| 5,756.0 | 2,043.0 | 26,671 | 156.4 |
| 5,757.0 | 2,147.0 | 28,776 | 157.1 |
| 5,758.0 | 2,251.0 | 30,965 | 157.9 |
| 5,759.0 | 2,355.0 | 33,268 | 158.6 |
| 5,760.0 | 2,460.0 | 35,675 | 159.3 |
| 5,761.0 | 2,565.0 | 38,187 | 160.0 |
| 5,762.0 | 2,669.0 | 40,804 | 160.7 |
| 5,763.0 | 2,775.0 | 43,256 | 161.4 |
| 5,764.0 | 2,880.0 | 46,354 | 162.1 |
| 5,765.0 | 2,974.0 | 49,289 | 162.9 |
| 5,766.0 | 3,085.0 | 52,318 | 163.6 |
| 5,767.0 | 3,194.0 | 55,458 | 164.3 |
| 5,768.0 | 3,302.0 | 58,706 | 165.0 |
| 5,769.0 | 3,409.0 | 62,062 | 165.7 |
| 5,770.0 | 3,514.0 | 65,525 | 166.4 |
| 5,771.0 | 3,618.0 | 69,089 | 167.1 |
| 5,772.0 | 3,720.0 | 72,758 | 167.9 |
| 5,773.0 | 3,821.0 | 76,529 | 168.6 |
| 5,774.0 | 3,921.0 | 80,401 | 169.3 |
| 5,775.0 | 4,019.0 | 84,371 | 170.0 |

Historic Inflow to Lake Davis

